January 7, 1958

Mr. E. A. Walker
Deputy Area Manager
U. S. Atomic Energy Commission
P. O. Box 66
Miamisburg, Ohio

Dear Mr. Walker:

The large calorimeter being used in the Isotope Separation Program has a cylindrical sample volume measuring 4-1/2 inches in diameter by 10 inches long and a lower limit of detectability of about 100 microwatts. This power corresponds to about three curies of tritium. Assuming that there is about 1.5 curies of tritium in each filament, a sample made up of 200 filaments (10,000 microwatts or 300 curies) could be assayed with a probable error of about one per cent. A similar quantity of tritium on the beds would be required in order to get the same accuracy. The time required to make an assay is strongly influenced by the thermal conductivity of the sample. Thus, it would be desirable to run batches of several hundred filaments forming a closely packed sample. The assay of filaments in the tubes would limit the amount of tritium to such an extent that this calorimeter would not give very accurate results.

In addition to this large calorimeter, two other calorimeters with cylindrical sample volumes measuring 1.6 inches in diameter by 4 inches long are available for use. The lower limit of detectability of these calorimeters is about 10 microwatts or 0.3 curies of tritium. For these calorimeters an assay with about one per cent probable error could be obtained with a sample made up of 20 filaments.

Equipment is not available at the present time to recover the tritium from the filaments and the beds. However, it is very likely that such equipment could be incorporated into the feed preparation line of the Hot Gas Facility.

Reference data:

1 ml (STP) of tritium gives 88 microwatts of power
1 curie of tritium gives 34 microwatts of power
1 gram of tritium equals about 10^4 curies of activity.

Very truly yours,

John F. Eichelberger
Research Director

JFE:msw
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